

C L A I M S

1. Cannula (1) for a medical or dental-medical handpiece (61a) for spraying a flow medium (6) which contains
5 abrasively effective particles, having
 - a cannula shaft (3) which is in substance straight
 - a sideways directed outlet nozzle (4) in the forward end region of the cannula shaft,
 - wherein in the cannula shaft (3) a first channel
 - 10 section (7a) of a delivery line (5) extends axially forwardly, from which there extends a second channel section (7b) sideways to the outlet nozzle (4)
 - wherein in the region of the apex (11) of the angle (W1) included by the channel sections (7a, 7b) there is
 - 15 arranged an impact wall (13) lying axially opposite to the first channel section (7a).
 - and/or the channel sections (7a, 7b) are surrounded by a protective wall (13a) at least over a part of their length,
 - 20 - and wherein the impact wall (13) and/or the protective wall (13a) are of a material that is more wear resistant or harder than the material of the cannula shaft (3).
2. Cannula (1) for a medical or dental-medical handpiece
25 (61a) for spraying a flow medium (6) which contains abrasively effective particles, having
 - a cannula shaft (3) which is in substance straight
 - a sideways directed outlet nozzle (4) in the forward end region of the cannula shaft,
 - 30 - wherein in the cannula shaft (3) a first channel section (7a) of a delivery line (5) extends axially forwardly, from which there extends a second channel section (7b) sideways to the outlet nozzle (4),

characterized in that,
that the cannula shaft (3) is of a ceramic material.

3. Cannula according to claim 2,
5 characterized in that,
in the region of the apex (11) of the angle (W1) included
by the channel sections (7a, 7b) there is arranged an
impact wall (13) lying axially opposite to the first
channel section (7a).
10 and/or the channel sections (7a, 7b) are surrounded by a
protective wall (13a) at least over a part of their
length,
and wherein the impact wall (13) and/or the protective
wall (13a) are of a material that is harder or more wear
15 resistant than the material of the cannula shaft (3).

4. Cannula according to any preceding claim,
characterized in that,
the material of the impact wall (13) and/or of the
20 ~~protective wall (13a) is harder or more wear resistant~~
that the material of the cannula shaft (3), and is
preferably of hard metal.

5. Cannula according to any preceding claim,
25 characterized in that,
the impact wall (13) and/or the protective wall (13a) is
of a plastic of a hardness of about 70 to 100 Shore or at
least about 150 N/mm², in particular about 180 to 220
N/mm², in accordance with the European standard EN ISO
30 2039-1.

6. Cannula according to claim 5,
characterized in that,

the plastic is of polyurethane (PUR) or polyetheretherketone (PEEK).

7. Cannula according to any preceding claim,
5 characterized in that,
the protective wall (13a) is in each case formed by means of a sleeve (8, 22).

8. Cannula according to claim 7,
10 characterized in that,
the nozzle sleeve (8) of the second channel section (7b) stands out to the side from the cannula shaft (3).

9. Cannula according to any preceding claim,
15 characterized in that,
the impact wall (13) is formed by means of an insert part (14) which sits releasably or non-releasably in a receiving hole (9) in the cannula shaft (3).

~~20 10. Cannula according to any preceding claim,~~
characterized in that,
the outlet nozzle (4) includes with the cannula shaft (3) an angle (W1) which is acute or is about 90° or is obtuse.

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11. Cannula according to any of preceding claims 6 to 8, characterized in that,
the sleeve (8) sits in a receiving hole (9) in the cannula shaft (3) at least with its rearward end region.

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12. Cannula according to claim 11, characterized in that,

the insert part (14) is arranged at the rearward end of the sleeve (8) on its forwardly directed side.

13. Cannula according to claim 11 or 12,
5 characterized in that,
with an arrangement of the outlet nozzle (4) at an obtuse angle (W1) the receiving hole (9) extends at least to the side of the first channel section (7a) away from the outlet nozzle (4) and the sleeve (8) likewise extends to
10 the side of the channel section (7a) away from the outlet nozzle (4) and with its end section passing through the first channel (7a) forms the insert part (14)..

14. Cannula according to any of preceding claims 1 to 12,
15 characterized in that,
the impact wall (13) extends approximately at right angles to the angle bisector (Wh) of the angle (W1).

15. Cannula according to any preceding claim,
20 ~~characterized in that,~~
the impact wall (3) is exchangeable and preferably held by means of a base body (48) releasably connected with the cannula shaft (3).

25 16. Cannula (1) for a medical or dental-medical handpiece (61b) for spraying a flow medium (6) that contains abrasively effective particles, having
- a cannula foot (2),
- a cannula shaft (3) extending substantially straight
30 forwardly from the cannula foot (2),
- an outlet nozzle (4) in the forward end region of the cannula shaft (3), directed sideways,

- whereby in the cannula shaft (3) a first channel section (7a) of a first delivery line (5) extends axially forwardly, from which there extends a second channel section (7b) sideways to the outlet nozzle (4),
5 characterized in that,
in the cannula (1) there extends a second delivery line (21) from an inlet opening (21a) in the region of the cannula foot (2) to a ring nozzle (21c) surrounding the second channel section (7b) in the region of the outlet
10 nozzle (4),
wherein a third channel section (21b) of the second delivery line (21) extends forwardly in substance parallel to the first channel section (7a) over a length section in the rearward end region, and
15 wherein the third channel section (21b) is formed by a ring gap (21d) which surrounds a straight channel sleeve (22) emplaced in the cannula shaft (3) and forming the first channel section (7a), and is connected in its forward end region with the ring nozzle (21c) by means of
20 ~~at least one continuing connection channel (58).~~

17. Cannula according to claim 16,
characterized in that,
the ring gap (21d) is formed in that the channel sleeve
25 (22) is continuously tapered in a ring-shape from its rearward end region forwardly.

18. Cannula according to claim 16 or 17,
characterized in that,
30 in the second delivery line (21) there is arranged a return flow blocking valve (35a, 35b).

19. Cannula (1) for a medical or dental-medical handpiece (61a, 61b) in particular for a medical or dental-medical handpiece (61a, 61b) for spraying a flow medium (6) which contains abrasively effective particles, having a
5 through-going channel (21),
characterized in that,
a return flow blocking valve (35a, 35b) is arranged in the channel (21).
- 10 20. Cannula according to claim 18 or 19,
characterized in that,
the return flow blocking valve (35a, 35b) is a membrane valve or a lip valve.
- 15 21. Cannula according to any of claims 18 to 20,
characterized in that,
the return flow blocking valve (35a, 35b) is or are arranged in the region of the outlet nozzle (4) and/or in the middle region of the cannula (1).
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- 20 22. Cannula according to claim 20 or 21,
characterized in that,
the return flow blocking valve (35a) has a ring-like membrane (52) the inner or outer edge of which is axially
25 fixed and the respective other edge (53) cooperates sealingly with a ring surface (8) and is a axially elastically bent outwardly through the flow pressure of the flow medium (6).
- 30 23. Cannula according to claims 18 to 22,
characterized in that,

the return flow blocking valve (35b) is arranged accessible from the rear in a rearward recess (41a), which is preferably closed by a closure part (37).

- 5 24. Cannula (1) for a medical or dental-medical handpiece (61a) for spraying a flow medium (6) which contains abrasively effective particles, having
- a cannula shaft (3) which is in substance straight
 - a sideways directed outlet nozzle (4) in the forward
- 10 end region of the cannula shaft,
- wherein in the cannula shaft (3) a first channel section (7a) of a delivery line (5) extends axially forwardly, from which there extends a second channel section (7b) sideways to the outlet nozzle (4),
- 15 - or a cannula according to any preceding claim, characterized in that,
- the cannula shaft (3) is of two longitudinal sections (1a, 1b) which are connected with one another by means of a connecting device (19) in the form of a plug-in
- 20 connection or a screw connection.

25. Cannula according to claim 24, characterized in that,
- the connecting device (19) is formed by means of a
- 25 connection recess (19c) arranged at the end face on the one longitudinal section (1a) and a connection pin (19d) arranged on the other longitudinal section (1b) and sitting in the plug-in recess (19c).

- 30 26. Cannula according to claim 24 or 25, characterized in that,
- the outer surfaces of the longitudinal sections (1a, 1b) end flush with one another.

27. Cannula according to any of claims 24 to 26,
characterized in that,
a second delivery section (21), for a treatment liquid,
5 in particular water, extends to the outlet nozzle (4).

28. Cannula according to claim 27,
characterized in that,
the second delivery line (21) has in the forward cannula
10 section (1b) a line section (103) extending from the
rearward end thereof forwardly, which with regard to the
first channel section (7a) is offset to the side, in
particular is offset towards the outlet nozzle (4).

15 29. Cannula according to claim 28,
characterized in that,
a line section (21d) extending longitudinally in the
rearward longitudinal section (1a) and the line section
(103) in the forward longitudinal section (1d) are
20 ~~connected with one another by means of a radial channel~~
which is preferably formed by means of a gap (104)
between the longitudinal sections (1a, 1b) arranged in
the base of the connection recess (19c).

25 30. Medical or dental-medical handpiece (61a, 61b) for
spraying a flow medium (6) that contains abrasively
effective particles, having
- a coupling element (64) for releasable connection of a
flexible supply line, arranged in its rearward end
30 region,
- a cannula (1) which has at its forward end the outlet
nozzle (4),

- a supply container (67) for abrasive particles arranged in the rearward end region of the handpiece (61a, 61b), and

5 - a first delivery line (5) which extends from the coupling element (64) through the supply container (67) to the outlet nozzle (4),

characterized in that,

that at least a section of the supply container (67) at least on its inner side,

10 and/or at least a line sleeve (81, 22, 8) extending between the supply container (67) and the outlet nozzle (4), and/or the outlet nozzle (4), is or are of a wear resistant plastic.

15 31. Handpiece according to claim 24,

characterized in that,

the plastic is polyurethane (PUR) or polyetheretherketone (PEEK).

20 ~~32. Handpiece according to claim 24 or 25~~

characterized in that,

that the hardness is about 70 to 100 Shore or at least about 150 N/mm², in particular about 180 to 220 N/mm², in accordance with the European standard EN ISO 2039-1.

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33. Handpiece according to claim 24 or 25,

characterized in that,

the supply container (67) has a pot-shaped container part (67a) which at its inner side or overall is of plastic.

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34. Handpiece according to any of claims 24 to 27,

characterized in that,

the plastic is non-transparent, preferably penetration dyed, in particularly penetration dyed black.

35. Cannula or handpiece according to any of claims 5 to 28,
characterized in that,
the plastic has a modulus of elasticity (Gpa) in tensile testing of about 3.7 to 4.0.

36. Cannula (1) for a medical or dental-medical handpiece (61a) for spraying a flow medium (6) which contains abrasively effective particles, having

a cannula shaft (3) which is in substance straight
a sideways directed outlet nozzle (4) in the
forward end region of the cannula shaft,

wherein in the cannula shaft (3) a first channel section (7a) of a delivery line (5) extends axially forwardly, from which there extends a second channel section (7b) sideways to the outlet nozzle (4),

~~or a cannula according to any preceding claim,~~

characterized in that,

the first cannula section (7a) has a channel widening (107) in its forward end region.

37. Cannula according to claim 36,

characterized in that,

the channel widening (107) is formed in that a sleeve (22) in the first delivery line section (7a) ends at a spacing before the second delivery channel (7b).

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38. Cannula according to claim 36 or 37,
characterized in that,

the channel widening (107) transitions convergently, in particular hollow conically, into the second channel section (7b).

- 5 39. Cannula according to any of preceding claims 36 to 38,
characterized in that,
the outlet nozzle (4) has a nozzle sleeve (8) which sits
in a receiving hole (9) in the cannula (1), and in that
10 the receiving hole (9) is extended beyond the first
delivery line (7a) in the cannula (1), in particular is
formed as a through-going hole and is closed at its end
away from the outlet nozzle (4).
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